

3.3.4 Records and Schematics of Non-Freshwater Artificial Penetrations

Available well records for the non-freshwater artificial penetrations within the Ineos composite AOR and operational/10,000-year plumes that penetrate the Injection Zone are included in Appendix B. Also included are schematics for those wells within the composite AOR. The records include those required by the Railroad Commission of Texas (drilling, completion, sidetrack, surveys, plugging, etc.).

3.3.5 Other Injection Well Operations

There is one Class II salt water disposal well (Map ID No. 70) located within the Ineos composite 2-mile radius AOR. This well currently has perforations between 5,428 feet and 5,433 feet, is located some 7,700 feet north of WDW-163, and was recompleted in 2000 to inject into a 4-foot thick sand between Sands 3 and 4 of the WDW-163 Injection Interval (immediately updip of this well's location, Sand 4 pinches out). An attempt was initially made to complete this well into the current perforated interval as a gas well in 1996 based on the 4-foot thick gas sand indicated by the well log, but the sand produced a minimal amount of gas before it was temporarily abandoned and later re-permitted as a saltwater injection well. The fact that this thin "stringer sand" produced gas indicates a trapping mechanism which provided reservoir isolation from the overlying/underlying non-productive Sands 3 and 4 of the WDW-163 Injection Interval. If there were communication with the overlying/underlying Sands 3 and 4 of the WDW-163 Injection Interval in a downdip direction (through a potential spill point of the small gas sand), the historic volume injected into AP 70 (42,837 bbls through 8/08) would be insignificant in relation to the historical and projected injection volumes in the WDW-163 modeling (less than 0.04 percent of the WDW-163 interval total). An expanded cross section specifically focusing on the WDW-163 Injection Interval, and connecting AP 70, AP 63, and WDW-163 is included as Figure 4-19. This cross section indicates that the sand stringer present in AP 70 is pinched out and absent in the next well (AP 63) downdip, before the more massive Sands 3 and 4 of the WDW-163 Injection Interval develop at WDW-163. Due to its average historical injection rate of less than 0.5 gpm, and this sand's apparent lack of communication with the WDW-163 Injection Interval sands, this

well was not included as an injection source in the modeling presented in Section 7.0. It is concluded that this well would have little if any impact on the plume movement or pressure effects in the WDW-163 Injection Interval if it were in communication with Sands 3 and 4 of the Ineos Injection Interval.

There is one Class II salt water disposal well (Map ID No. 27) located outside of the composite 2-mile radius AOR, but within the 10,000-year plumes. This well injected saltwater into perforations from 5,110 to 5,135 feet, which is into sand strata above the WDW-163 Injection Interval. The permitted maximum injection rate in this well was 44 gpm, although this well is currently shut in.

A detailed dip cross section included as Plate 4-12 demonstrates that Map ID Nos. 70 and 27 do not inject into the same sand strata as those used by Ineos for their injection wells. Copies of these two wells' electric logs are included in Appendix C.

3.3.6 Summary of Non-Freshwater Artificial Penetrations Within the Composite 2-Mile Radius AOR

The 36 non-freshwater artificial penetrations identified and located within the Ineos composite 2-mile radius AOR that penetrate to at least the top of the Ineos Injection Zone include:

Producing Oil and/or Gas Wells

There are five producing oil wells located within the Ineos composite 2-mile radius AOR (Map ID Nos. 71, 95, 96, 97, and 98). Each of the producing wells is completed in sand horizons which are below the WDW-163 Injection Interval and above the WDW-165 Injection Interval. Map ID No. 71 produces oil from the Heyser South (5400 #2) Field; and Map ID Nos. 95, 96, 97, and 98 produce oil from the Guajolote Suerte (5750) Field.

Plugged and Abandoned Wells

There are 24 plugged and abandoned wells within the Ineos composite 2-mile radius AOR (Map ID Nos. 1, 2, 6, 8, 11, 19, 28, 29, 30, 33, 37, 38, 39, 40, 41, 42, 43, 44, 62, 63, 69, 73, 100, and 150). Most of the wells were drilled no deeper than approximately 6,000 feet with a few of the wells drilled to 8,000+ feet. The plugged wells which are subject to the plugging protocol review are considered to be properly and/or adequately plugged in a manner to prevent the upward migration of fluids and would not be affected by pressure increases in the Injection Zone reservoir due to injection operations at Ineos.

Shut In and Temporarily Abandoned Wells

There are three shut in hydrocarbon producing wells in the AOR. They are Map ID Nos. 31, 50A, and 99.

Saltwater Disposal Wells

Salt water disposal is conducted into Map ID No. 70. Map ID No. 70 injects into strata between Sands 3 and 4 of the WDW-163 Injection Interval, and above the WDW-165 Injection Interval. The well is currently operated by Unit Petroleum Co. The well is the #55 E. H. Welder and has a total depth of 8,207 feet and is plugged back above 5,630 feet. Current perforations are between 5,428 feet and 5,433 feet. This well is permitted for a maximum injection rate of 250 bbls/day (7.3 gpm), but injects at an average rate of three gpm.

Class I Injection Wells

There are three active Class I hazardous injection wells (WDW-163, WDW-164, and WDW-165) within the Ineos composite 2-mile radius AOR that inject into the Ineos Injection Intervals. These three Ineos injection wells are monitored continuously for annular integrity, and yearly mechanical integrity testing for each well demonstrates that sufficient cement is in place to adequately prevent upward migration of fluids above the top of the Injection Zone.

3.3.6.1 Wells Within Cone of Influence

There are no non-freshwater artificial penetrations within the Ineos cones of influence, since the largest cone of influence does not extend beyond 200 feet from the wellbores of the Ineos injection wells.

3.3.6.2 Wells Within Fixed Area of Review

The fixed Area of Review is an area encompassed within a composite 2-mile radius of the petitioned injection wells for purposes of this no-migration demonstration. There are 36 artificial penetrations within the composite 2-mile radius AOR that penetrated the top of the Injection Zone. Although none of these artificial penetrations are within the Ineos pressure cones of influence (other than the three Ineos injection wells), each well was evaluated subject to both the non-endangerment and "no-migration" standard. The applicable non-endangerment standard requires that plugged and abandoned artificial penetrations have a cement plug or mud plug of sufficient weight located between the top of the Injection Interval and the base of the lowermost USDW, and that operating artificial penetrations (producing wells, injection wells) have cemented casing between the top of the Injection Interval and the base of the lowermost USDW. The operating wells meet the standards through the presence of cemented casing strings. The plugged wells meet the standards through the presence of at least a 9.0 ppg mud plug, as they are outside of the cones of influence. All of the wells meet the no-migration standard through the presence of cemented casing strings across the top of the Injection Zone or boreholes filled with sufficient thickness of drilling mud and/or cement plugs, preventing movement of waste constituents out of the Injection Zone at levels above health-based limits. Each of the subject artificial penetrations discussed herein have been evaluated to ascertain that each well meets the non-endangerment criteria based on the non-endangerment and no-migration standards.

The locations for the 36 non-freshwater artificial penetrations within the composite 2-mile radius composite AOR that penetrate to the top of the Injection Zone are shown in Plate 3-1. Table 3-3 is a tabulation of the non-freshwater artificial penetrations that

penetrate the Injection Zone within the Ineos 2-mile radius composite AOR. Records for these wells are presented in Appendix B. Schematics of the wells within this composite AOR are also provided in Appendix B. These wells all meet the non-endangerment standards through the presence of at least a mud plug in the borehole. These wells meet the no-migration standard through the presence of cemented casing or sufficient thickness of cement/mud plugs, preventing movement of waste constituents out of the Injection Zone at levels above health based limits. The distance in these wells between the top of the shallowest Injection Interval and the top of the Injection Zone is greater than the distance calculated for upward movement of waste constituents over 10,000 years in a mud-filled borehole due to diffusion (see previous discussion in Section 3.1.1)

3.3.7 Wells Within the Boundaries of the 10,000-year Modeled Plumes

There are 108 non-freshwater artificial penetrations that penetrated the top of the Ineos Injection Zone outside the fixed composite 2-mile radius AOR, but within the boundaries of the 10,000-year modeled plumes (Map ID Nos. 3-5, 7, 9-10, 12-18, 20-27, 32, 34-36, 45, 65-68, 72, A-Z, AA-FF, LL-NN, PP-TT, VV, AAA, 101-126, 132, 133, and 141-144). The applicable no-migration criteria require that such wells be adequately completed and, if plugged, the borehole should be filled with sufficient drilling mud, casing or cement plugs to prevent movement of hazardous waste constituents out of the Injection Zone at levels above the Land Ban health-based limits. Operating artificial penetrations (producing wells, injection wells) are evaluated to ensure that they have cemented casing or annulus mud between the top of the Injection Interval and the top of the Injection Zone. These wells have been evaluated to ascertain that they meet the no-migration criteria based on the boundaries of the 10,000-year waste plumes. A discussion of how each of these wells meets the no-migration standard is presented in Section 3.1.1 above, under the No-Migration Standards discussion.

The locations for the non-freshwater artificial penetrations outside the fixed composite 2-mile radius area of review, but within the boundaries of the low-density 10,000-year modeled plumes, are shown on Plate 3-1. Table 3-4 is a tabulation of the non-freshwater

artificial penetration that penetrated the Injection Zone within that area of the 10,000-year plumes, but outside of the composite AOR. These non-freshwater artificial penetrations meet the no-migration standards, based on the above criteria.

3.4 Area of Review Well Plugging and Abandonment History

This section summarizes the drilling history, mud weights used, and plugging methods and requirements for artificial penetrations drilled within and in the surrounding fields of the Ineos composite AOR. This information is included to demonstrate that the 9.0 lb/gal mud weight and borehole diameter used in the non-endangerment calculations are valid and conservative values.

This information is very useful when reviewing the older artificial penetration records to determine if a particular well was adequately plugged. Typically, some of these earlier oil and gas records will contain limited or non-specific information as to the actual depths and volumes of cement plugs or mud weights used. This is, however, common to most of the United States and not just to Texas. Texas probably has maintained one of the better regulatory programs and records systems for oil and gas throughout the years and has recognized the need for proper plugging of abandoned wells since before 1900 (House Bill 542, 1899).

It is important to understand the plugging requirements that were in effect when a particular well was plugged. In cases where Texas plugging records are available but do not specifically identify the actual mud weight left in the hole or the specific locations of cement plugs, the plugging form usually asks if mud and/or cement plugs were used or if all abandoned wells in the field were plugged according to Railroad Commission of Texas (RRC) requirements. If a plugging form documents that RRC requirements were followed without additional details, then mud and cement plugs in the well would meet at least the minimum plugging requirements of the RRC.

The first legislation concerning plugging of abandoned oil and gas wells in Texas was passed in 1899 with House Bill 542. This bill however did not designate regulatory or enforcement authority to a particular branch of the state government. The Railroad Commission of Texas (RRC) was given regulatory responsibility for proper well plugging in 1919 by Senate Bill 350.

Plugging requirements as set forth by the RRC did not change between 1934 and 1967 when Rule 14 of the RRC was adopted. This time period covers the drilling period of the majority of the local oil and gas fields.

1934 to 1967: Basic RRC plugging requirements between 1934 and 1967 were:

1. If the well was hydrocarbon productive with cemented production casing in the well, the well had to be plugged back with cement to a point at least 50 feet above the production casing shoe. Following the placement of the cement plug, the well had to be filled from the top of the cement plug to the surface with 10.0 pounds per gallon mud.
2. If the well was hydrocarbon productive with uncemented production casing in the well, the entire producing formation had to be plugged off with cement before the casing seat was broken. After the unseated production casing was pulled from the well, the well had to be filled with 10.0 pounds per gallon mud from top of the cement to the ground surface.
3. If the well was hydrocarbon productive through an irretrievable screen or perforated liner, the well had to be plugged back to a point 10 feet above the top of the liner or screen. Following placement of the cement plug, it was required that the well be filled with 10.0 pounds per gallon mud from the top of the cement plug to the ground surface.
4. If the well was a dry hole, the hole had to be filled with 10.0 pounds per gallon mud from total depth to surface.

At the discretion of the RRC, cement plugs could be required across fresh water or gas sands. In all cases, cement plugs and mud had to be emplaced by the circulation method through tubing or drill pipe. Notices of "intention to plug" and "plugging record" were required of all operators. These records were to be completed and filed on RRC Form 2A and Form 4.

1967 to Present: On January 1, 1967, Rule 14 of the RRC was adopted. Rule 14 amended the plugging requirements and provided the detailed plugging requirements currently used for abandoned oil and gas wells in Texas. Rule 14 was later amended effective January 1, 1983. These amendments to previous plugging requirements and those additionally mandated by Rule 14 cover the drilling period in the area from 1956 to 1981. The TCEQ has basically followed the RRC requirements for wells (disposal, etc.) within their jurisdiction.

For properly plugged wells, Rule 14 specifies a combination of cement plugs and mud-laden fluid to confine oil, gas, or water to the strata in which they naturally occur. The TRRC reviews all plugging plans for adequacy and requires modifications as appropriate. Rule 14 requirements cover the period from 1967 to the present and are summarized as follows:

1. Notice of intention to plug and abandon is required to be filed on Form W-3A.
2. Offset landowners and well operators are required to be notified of intention to plug.
3. Plugging of the well must begin within one year of the end of drilling or production operations. Extensions may be granted provided no pollution hazard exists and adequate financial assurance has been made.
4. A 100-foot cement plug is required immediately above the uppermost-perforated zone or produced horizon.
5. In wells with irretrievable screen or perforated liners, a cement plug is required at least 100 feet above the top of the liner.
6. If the production casing was removed from the well, a cement plug is required from 50 feet below the surface casing shoe to 50 feet above the surface casing shoe.
7. If the removal or non-placement of production casing exposed freshwater horizons, a cement plug is required from 50 feet below the base of the deepest fresh water sand to 50 feet above the top of that sand.
8. A ten-foot cement plug is required in the top of the well.
9. Mud weighing 9.5 pounds per gallon or more is required in all portions of the well not filled with cement.

At the discretion of the TRRC, additional cement plugs could be required. All cement and mud plugs are required to be emplaced by the circulation method.

REFERENCES

Barker, S. E., 1981, "Determining the Area of Review for Hazardous Waste Disposal Wells", M. S. Thesis, The University of Texas at Austin.

Clark, J. E., Papadeas, P. W., Sparks, D. K., and R. R. McGowen, 1991, "Gulf Coast Borehole Test Well, Orangefield, Texas," Proceedings of the Winter and Summer Meetings of the Underground Injection Practices Council, pp. 219-238.

Johnson, O. C. and B. K. Knape, 1986, Pressure Effects of the Static Mud Column in Abandoned Wells: Texas Water Commission, LP 86-06, p. 1-17.

United States Geologic Survey, 1995, Green Lake and Bloomington SW 7.5 Minute Topographic quadrangle maps.

TABLE 3-3

TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 2-MILE RADIUS COMPOSITE AOR

*Ineos USA LLC
Port Lavaca, Texas*

Map ID #	Well # and Lease	Total Depth (ft)	Distance to Injection Wells			Status	Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data		
			WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)			Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)	
1	J. M. Mecom #15 Minnie S. Welder	9,010	5850	5100	4400	P & A	07/15/52 07/16/52	Surface	10.75	500	-	Surface	310	Yes	13.4	
2	Superior Oil Company #1 Pat Welder	9,308	12000	11250	10550	P & A	04/29/57 05/29/57	Surface	11.75	1604	-	Surface	453-596	75		
6	Exxon Corporation #50-A. P. H. Welder	5,600	10800	10300	9950	P & A	05/19/74 05/19/74	Surface	8.625	1578	-	Surface	to 1367	165		
8	Humble Oil & Refining Co. #47 P. H. Welder "A"	5,570	11025	10600	10350	P & A	01/24/72 04/04/94	Surface Production	8.625 2.875	1522 5541	5 1573	Surface	355 110 1713-1300 16-Surface	5		
													500	Yes	9.5	
													300			
													5391-4722	20		
													1570-1401	75		
													80-6	25		
11	Humble Oil & Refining Co. #37-A. P. H. Welder	5,600	10950	10650	10450	P & A	11/13/67 04/12/94	Surface Production	8.625 2.875 2.875	1556 5595 5596	5 1606 1606	Surface	525 365 2334	525	Yes	9.5
													5509-4857	25		
													5377-4592	25		
													1606-1383	75		
19	Humble Oil & Refining Co. #39 E. H. Welder	5,600	10150	9975	9825	P & A	08/31/68 07/20/92	Surface Production	8.625 2.875 2.875	1603 5595 5589	3 1655 1655	Surface	635 372 2770	635	Yes	9.7
													1660-1302	100		
													50-5	15		
28	Humble Oil & Refining Co. #29 E. H. Welder	5,600	10600	10550	10600	P & A	08/11/67 03/08/89	Surface Production	8.625 2.875 2.875	1054 5597 5598	1110 1150	Surface	430 310 3325	430	Yes	9.8
													5400-5100	14		
													1650-I350	10		
													5500-5400	14		
													1550-1350	78		
													1150-932	70		
													37-4	10		
29	Humble Oil & Refining Co. #33 E. H. Welder	5,600	9400	9325	9350	P & A	12/06/67 09/24/81	Surface Production	8.625 2.875	1604 5579	1700	Surface	800 330 3417	800	Yes	9.5
													5585-3375	70		
													2350-1900	40		
													1619-1485	50		
30	Humble Oil & Refining Co. #35 E. H. Welder	5,600	10350	10200	10200	P & A	02/27/68 08/07/92	Surface Production	8.625 2.875 2.875	1638 5596 5591	3 1695 1690	Surface	550 265 3602	550	Yes	9.5
													5390-4899	20		
													4895-4535	10		
													5455-4667	25		
													1694-1301	95		
31	Humble Oil & Refining Co. #31 E. H. Welder	5,600	10150	10200	10300	Shut in	10/25/67	Surface Production	8.625 2.875 2.875	1053 5600 5586	-	Surface	653 579 3218	653	-	-

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TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 2-MILE RADIUS COMPOSITE AOR

Ineos USA LLC
Port Lavaca, Texas

Map ID #	Well # and Lease	Total Depth (ft)	Distance to Injection Wells			Status	Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data		
			WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)			Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)	
33	Humble Oil & Refining Co. #36 E. H. Welder	5,600	10000	10150	10350	P & A	01/30/68 02/25/82	Surface Production Production Tubing	8.625 2.875 2.875 1.25	1542 5602 5436 5475	-	Surface 3687	500 275	Yes	9.5	
												5395-Surface 5392-2505 2802-1615 1600-Surface 60-Surface	167 80 67 90 20			
37	Humble Oil & Refining Co. #1 E. H. Welder	6,199	9300	9450	9700	P & A	02/10/36 03/03/36	Surface Production	16.00 10.75	288 1473	-	Surface Surface	50 550	Yes	NA	
38	Humble Oil & Refining Co. #24 E. H. Welder	5,875	7900	7650	7550	P & A	07/11/65 07/11/65	Surface	9.625	544	-	Surface	1473-1200 1650-494 94-Surface	410	Yes	NA
39	Unit Petroleum #27 E. H. Welder	5,605	7175	7100	7100	P & A	07/03/66 01/31/01	Surface Production	7.00 2.875	558 5596	3 3	Surface 1665	260 570	Yes	9.5	
40	Humble Oil & Refining Co. #25 E. H. Welder	5,660	6225	6050	6050	P & A	11/03/65 2/29/71	Surface Production	7.625 2.875	524 5601	-	Surface Surface	5205-5185 1586-0	15	Yes	9.5
41	Humble Oil & Refining Co. #23 E. H. Welder	6,507	6800	6500	6350	P & A	06/07/65 06/01/94	Surface Production	8.625 2.875	1676 5701	-	Surface	5540-5040 20-5	3	Yes	9.7
												5283-4578 1740-1391 80-5	20 140 25			
42	Humble Oil & Refining Co. #26 E. H. Welder	5,630	6350	6300	6400	P & A	01/02/66 01/14/66	Surface	8.625	523	-	Surface	2000-430 100-Surface	570	Yes	9.6
43	Humble Oil & Refining Co. #43 E. H. Welder	8,336	5950	8400	6800	P & A	10/11/71 10/14/71	Surface	8.625	2025	-	Surface	8336-7735 1950-1840 30-20	320 175 100 10	Yes	10.5
44	Humble Oil & Refining Co. #42 E. H. Welder	8,226	8050	8600	9100	P & A	10/07/70 08/04/78	Surface Production	8.625 2.875	2064 8106	-	Surface 2624	825 830 8226-7265 2150-1995 254	35 35 5	Yes	9.5
50A	Unit Petroleum Co. #56 Mrs. E. H. Welder	6,611	7250	7150	7150	Temporarily Abandoned	01/04/97	Surface Production Tubing	8.625 4.5 2.375	1584 5921 5475	-	Surface 4900	720 630	-	-	
62	Exxon Corporation #46 E. H. Welder	5,850	7200	6525	6000	P & A	08/09/78 11/30/79	Surface Production	8.625 2.875	1614 5835	-	Surface 2847	790 870 5340-3940 1665-1227 30-5	40 110 10	Yes	9.5
63	Exxon Corporation #44 E. H. Welder	5,800	3500	3100	3000	P & A	07/31/78 08/01/78	Surface	8.625	1622	-	Surface	1750-1440 40-10	820 100 10	Yes	9.5

TABLE 3-3

TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 2-MILE RADIUS COMPOSITE AOR

Ineos USA LLC
Port Lavaca, Texas

Map ID #	Well # and Lease	Distance to Injection Wells				Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data		
		Total Depth (ft)	WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)		Status	Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (cu)	Mud Filled (Y/N)	Mud Weight (lb/gal)
69	Exxon Corporation #45 E. H. Welder	8,586	10400	10675	10950	P & A	12/09/80 05/24/94	Surface Production	8.625 2.875	1558 6018	5 1609	Surface 6476	780 465 CIBP@5820 5456-4893 1609-1371 80-6	Yes	9.7
70	Unit Petroleum #55 E. H. Welder	8,207 5,630 PB	7700	7175	6700	Salt water Injection	06/04/87	Surface Production Tubing	9.625 5.50 2.375	1664 5994 5352	-	Surface 4054	580 860 8207-6012 5733-5713 5650-5630	-	-
71	Exxon Corporation #49 E. H. Welder	5,880 5,439 PB	7775	7000	6500	Producing Oil	02/11/85	Surface Production Tubing	8.625 5.50 2.875	1642 5877 5345	-	Surface 4663	970 200 5700-5680 CR@5439	-	-
73	Exxon Corporation #48 E. H. Welder	5,900	7450	7100	6900	P & A	03/02/83 03/05/83	Surface	8.625	1732	-	Surface	780 1872-1566 20-Surface	Yes	9.5
95	Cummins & Walker Oil Co. #1 P.W.L.R.	6,900 PB 5,957 TVD	8400	9200	10000	Producing Oil	2/28/02	Surface Production Tubing	9.625 4.50 2.375	1507 6001 5744	-	Surface 4450	580 585	-	-
96	Cummins & Walker Oil Co. #1 BP Chemicals	5,927 TVD	7000	7800	8600	Producing Oil	3/25/02	Surface Production Tubing	9.625 4.50 2.375	1519 5927 5731	-	Surface 4500	580 515	-	-
97	Cummins & Walker Oil Co. #2 P.W.L.R.	6,400 MD 5,907 TVD	9350	10100	10950	Producing Oil	10/08/02	Surface Production Tubing	9.625 4.50 2.375	1597 MD 6389 MD 6239 MD	-	Surface 4500	600 480	-	-
98	Cummins & Walker Oil Co. #2 BP Chemicals	7,000 PB 5,932	5900	6700	7500	Producing Oil	03/22/03	Surface Production Tubing	8.625 4.50 2.375	1532 5988 5745	-	Surface 4344	425 440	-	-
99	Cummins & Walker Oil Co. #3 P.W.L.R.	7,670 MD 7,000 TVD	10100	10900	11700	Shut In	03/20/03	Surface Production Tubing	9.625 4.50 2.375	1572 MD 6510 MD 6251 MD	-	Surface 4500	650 400	-	-
100	Cummins & Walker Oil Co. #4 P.W.L.R.	8,121	10350	11000	11600	P & A	3/29/04 3/31/04	Surface	9.625	2273	3	Surface	2323-2146 1524-1400 825-575 325-10 10-3	Yes	10.5
150	Cummins & Walker Oil Co. #4 BP Chemicals	7,044	7700	8500	8200	P & A	02/05/05 02/06/05	Surface	9.625	2387	4	Surface	2394-2294 1544-1450 851-751 379-279 13-3	Yes	9.7
WDW 163	Ineos USA LLC #1 Injection Well	6,049	0	800	1600	Class I Injection	10/83	Surface Production Tubing	13.375 9.625 5.5	1812 6004 5221	-	Surface Surface	1300 3840	-	-
WDW 164	Ineos USA LLC #2 Injection Well	8,270	800	0	800	Class I Injection	01/81	Surface Production Tubing	13.375 9.625 5.5	1825 7478 7244	-	100 Surface	-	-	-

TABLE 3-3

TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 2-MILE RADIUS COMPOSITE AOR

**Ineos USA LLC
Port Lavaca, Texas**

Map ID #	Well # and Lease	Total Depth (ft)	Distance to Injection Wells			Status	Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data	
			WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)			Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)
WDW 165	Ineos USA LLC #3 Injection Well	7,567	1600	800	0	Class I Injection	03/81	Surface Production Tubing	13.375 9.625 5.5	1724 6381 6740	-	Surface Surface	2150 1687	-	-

Note: NA – not available

TABLE 3-4
**TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 10,000-YEAR PLUMES
 THAT PENETRATE THE INJECTION ZONE**

**Ineos USA LLC
 Port Lavaca, Texas**

Map ID #	Well # and Lease	Distance to Injection Wells				Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data		
		Total Depth (ft)	WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)		Status	Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)
3	John W. Mecom #12 Minnie S. Welder	8502	14069	13345	12655	P & A 05/06/51 05/06/51	Surface	10.75	1231	-	Surface	525	Yes	NA	
4	Superior Oil Company #2 P. H. Welder	8862	14300	13600	13025	P & A 07/12/57 07/12/57	Surface	11.75	1603	-	Surface	1281-1181 5220-5002 1631-1375 9-Surface	100 100 150 5	Yes	12.6
5	Humble Oil & Refining Co. #42-A. P. H. Welder	6500	14350	13800	13350	P & A 04/20/68 04/20/68	Surface	8.625	1560	-	Surface	600	Yes	10	
7	Exxon Corporation #49-A. P. H. Welder	5615	11775	11300	10950	P & A 03/21/73 03/21/73	Surface	8.625	1575	2	Surface	1780-1452 1717-1459 20-Surface	100 100 10	Yes	15.6
9	Humble Oil & Refining Co. #44-A. P. H. Welder	5575	12500	12100	11775	Shut In 10/31/68	Surface Production Production	8.625 2.875 2.875	1519 5570 5575	-	Surface	490	-	-	
10	Exxon Corporation #39-A. P. H. Welder	5600	11600	11225	11000	P & A 03/22/68 03/31/89	Surface Production	8.625 2.875	1551 5600	1591	Surface 4476	600	Yes	9.5	
												300			
												5470-5108 1610-1384 38-5	10 68 10		
12	Humble Oil & Refining Co. #41-A. P. H. Welder	5572	12050	11750	11500	Temporarily Abandoned 1995	Surface Production	8.625 2.875	1560 5572	-	Surface 3385	600	-	-	
13	Humble Oil & Refining Co. #36 P. H. Welder	5600	12800	12450	12200	P & A 08/20/67 03/29/94	Surface Production	8.625 2.875	1043 5592	-	Surface 4551	310	Yes	9.5	
												250			
												5489-4837 1550-1244 1093-873 80-6	20 70 56 30		
14	Humble Oil & Refining Co. #43-A. P. H. Welder	5575	14300	13800	13400	P & A 09/15/68 04/05/89	Surface Production	8.625 2.875	1531 5569	1534	Surface 2775	350	Yes	9.8	
												430			
												5507-2103 1575-1345 100-5	46 65 32		
15	Humble Oil & Refining Co. #32 P. H. Welder "A"	5600	14200	13800	13500	P & A 04/26/62 04/26/62	Surface	7.625	1087	-	Surface	1310-1005	70	Yes	NA
15A	Unit Petroleum Co. #53-A Welder	8600 5750 PB	15500	15000	14600	Producing Oil 9/4/97	Surface Production	8.625 4.50	1600 6101	-	Surface 4900	860	-	-	
16	Humble Oil & Refining Co. #30-A. P. H. Welder	5600	14950	14600	14200	P & A 05/07/61 05/07/61	Surface	7.625	1107	-		665			
												5580-5180 CIBP@1045	100 60	Yes	NA
17	Humble Oil & Refining Co. #29-A. P. H. Welder	9000	13400	13100	12850	P & A 06/05/55 06/05/55	Surface Production	10.75 5.50	1529 6308	-	Surface 4937	1529-Surface 5955-4937	100 75	Yes	11.5
17A	Humble Oil & Refining Co. #1 P. H. Welder	6506	13150	12850	12600	P & A 04/01/36 04/01/36	Surface	10.75	1493	-	Surface	1092	70	Yes	10
18	Humble Oil & Refining Co. #40 P. H. Welder "A"	5550	11700	11450	11300	P & A 08/25/68 08/26/68	Surface	8.625	1056	-	Surface	1077-847 10-Surface	100 10	Yes	9.7

TABLE 3-4

**TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 10,000-YEAR PLUMES
THAT PENETRATE THE INJECTION ZONE**

**Ineos USA LLC
Port Lavaca, Texas**

Map ID #	Well # and Lease	Total Depth (ft)	Distance to Injection Wells			Status	Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data		
			WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)			Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)	
20	Humble Oil & Refining Co. #30 E. H. Welder	5600	11000	10800	10650	P & A	09/14/67 07/07/92	Surface Production Production	8.625 2.875 2.875	1021 5593 5537	1085 4000 4000	Surface	430 300 5266-4725 15 1550-1228 5 1550-1120 75 1085-898 60 80-5 25	-	Yes	9.5
21	Exxon Corporation #B-1(#22) E. H. Welder	5600	11300	11150	11100	Shut In	10/06/60	Surface Production	7.625 2.875	1120 5593	-	Surface	-	-	-	-
22	Humble Oil & Refining Co. #20-A. P. H. Welder	5472	14075	13900	13800	P & A	02/07/38 07/09/90	Surface Production	10.75 5.50	1029 5454	-	Surface	-	Yes	9.5	
23	Humble Oil & Refining Co. #27 Patrick H. Welder "A"	5495	14690	14440	14250	P & A	03/11/39 06/29/51	Surface Production	10.75 5.50	1024 5478	-	402 4007	300 300	Yes	NA	
24	Humble Oil & Refining Co. #15 E. H. Welder	5479	13700	13600	13500	Temporarily Abandoned	12/28/37	Surface Production	10.75 5.50	1055 5461	-	Surface	-	-	-	
25	Humble Oil & Refining Co. #16 E. H. Welder	5480	13450	13375	13300	Producing Gas	01/14/38	Surface Production	10.75 5.50	996 5465	-	Surface	-	-	-	
26	Humble Oil & Refining Co. #14 E. H. Welder	5468	14150	14110	14200	P & A	12/13/37 11/16/72	Surface Production	10.75 5.50	1508 5455	-	3984	300 300 5424-5248 20 1521-1420 60 16-4 6	Yes	9.5	
27	Humble Oil & Refining Co. #17 E. H. Welder	5478	13250	13250	13300	Shut In	05/31/38	Surface Production	10.75 5.50	952 5470	-	Surface	300 300	-	-	
32	Humble Oil & Refining Co. #34 E. H. Welder	6300	12900	13150	13400	P & A	12/30/67 01/12/68	Surface	8.625	1540	-	Surface	500 1758-1419 100 10-0 10	Yes	9.7	
34	Humble Oil & Refining Co. #40 E. H. Welder	5510	11850	12000	12200	P & A	03/03/70 06/29/90	Surface Production	8.625 2.875	1551 5509	1625	2419	550 500 1620-1363 81 100-5 29	Yes	9.8	
35	Humble Oil & Refining Co. #32 E. H. Welder	5600	11200	11400	11600	P & A	12/21/67 04/28/94	Surface Production	8.625 2.875 2.875	1602 5594 5592	5 1652 1652	Surface	600 265 5402-4810 30 5430-3704 50 1652-1387 85 80-5 30	Yes	9.6	

TABLE 3-4

**TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 10,000-YEAR PLUMES
THAT PENETRATE THE INJECTION ZONE**

**Ineos USA LLC
Port Lavaca, Texas**

Map ID #	Well # and Lease	Total Depth (ft)	Distance to Injection Wells			Status	Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data		
			WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)			Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)	
36	Humble Oil & Refining Co. #23 E. H. Welder	5550	11250	11500	11775	P & A	04/15/68 07/01/94	Surface Production Liner	8.625 2.875 2.083	1531 5381 5544	5 1580	Surface 4999			Yes	9.5
												5048-4652 1580-1365 80-5	102 60 75 25			
45	Humble Oil & Refining Co. #28 E. H. Welder	8000	12300	12850	13350	P & A	08/29/66 09/20/66	Surface Production	9.625 2.875	1552 5916	-	Surface 3571			Yes	NA
												5475-5125	500			
65	Humble Oil & Refining Co. #41 E. H. Welder	5515	11300	11375	11550	P & A	05/14/69 05/13/94	Surface Production	8.625 2.875 2.875	1458 5477 5481	1550 1550	Surface 1749 1749			Yes	9.7
												5324-4675 5287-4546 1550-1361 80-6	400 485 75 25			
66	Humble Oil & Refining Co. #45/45-F. P. H. Welder "A"	5622	13450	13000	12700	P & A	11/15/68 07/30/90	Surface Production	8.625 2.875 2.875	1540 5617 5621	1025 432	Surface 3718			Yes	9.5
												4660-4395 5554-4527 1590-430 1649-1032 1090-985 465-378 160-7	390 440 30 35 53 8 75 25 50			
67	Humble Oil & Refining Co. #21 P. H. Welder "A"	5493	14310	14100	13950	P & A	05/02/38 05/26/94	Surface Production	10.75 5.50	1030 5485	1094	407 4014			Yes	9.7
												5484-5305 1550-1415 1095-980 46-5	300 300 70 65 20			
67A	Unit Petroleum Co. #56-A Welder	6500	14500	14300	14100	P & A	12/0/97 12/6/97	Surface	8.625	1620	-				Yes	9.6
												5500-5350 1670-1550 850-750 13-3	50 35 35 5			
68	Humble Oil & Refining Co. #38-A. P. H. Welder	5567	13825	13400	13150	P & A	03/30/68 03/21/89	Surface Production	8.625 2.875 1.25	1543 5554 5011	-	Surface 3154			Yes	9.5
												5414-5200 1588-1376 37-4	11 65 10			
72	Exxon Corporation #47 E. H. Welder	7985	13100	12400	11775	P & A	04/14/81 04/16/81	Surface	8.625	1692	-	Surface			Yes	9.5
												7985-7750 1910-1580	70 100			
A	Humble Oil & Refining Co. #12 E. H. Welder	5555	15150	15100	15150	P & A	08/17/37 05/13/94	Surface Production	10.75 5.50 2.875 1.25	1024 5437 5550 5415	402 4472 4840 1798				Yes	9.6
												1824-1602 1550-1415 1088-960 46-5	15 95 70 20			

TABLE 3-4

**TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 10,000-YEAR PLUMES
THAT PENETRATE THE INJECTION ZONE**

**Ineos USA LLC
Port Lavaca, Texas**

Map ID #	Well # and Lease	Total Depth (ft)	Distance to Injection Wells			Status	Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data	
			WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)			Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)
B	Humble Oil & Refining Co. #4 E. H. Welder	5475	15225	15150	15200	Temporarily Abandoned	11/27/36 1996	Surface Production Tubing	10.75 7.00 2.50 2.00	1004 5475 5457 14	-	382 4137	300 300	-	-
C	Humble Oil & Refining Co. #5 E. H. Welder	5486	15500	15350	15300	Producing Oil	04/06/37	Surface Production Tubing	10.75 7.00 2.50	1024 5469 5436	-	402 4131	300 300	-	-
D	Humble Oil & Refining Co. #8-A P. H. Welder	5554	15700	15550	15500	P & A	03/04/37 03/14/89	Surface Production Tubing	10.75 7.00 2.875 1.25	985 5459 5550 5490	1003 2372 2866	4121	300 300	Yes	9.5
												1610-1461 1060-930 25-4	60 55 10		
E	Humble Oil & Refining Co. #11-A P. H. Welder	5494	16000	15800	15700	Temporarily Abandoned	05/06/37 1996	Surface Long String Liner Tubing	10.75 7.00 5.00 2.50	1027 5470 5491 5446	-	569 4440 5418	300 300 25	-	-
F	Humble Oil & Refining Co. #13 E. H. Welder	5494	14350	14250	14300	P & A	08/27/37 05/20/94	Surface Production	10.75 5.50	1008 5476	1020	386 4005	300 300	Yes	9.7
												5469-5250 1550-1410 1073-935 46-5	30 70 80 20		
G	Humble Oil & Refining Co. #7 E. H. Welder	5478	14550	14400	14375	P & A	04/24/37 10/06/81	Surface Production	10.75 7.00	1027 5449	-	4111	300 300	Yes	9.5
												5475-5270 2252-2150 1092-990 to Surface to Surface	25 60 50 20 15		
H	Humble Oil & Refining Co. #14-A P. H. Welder	5480	14850	14700	14600	Temporarily Abandoned	05/20/37 1996	Surface Production Tubing	10.75 7.00 2.00	1008 5475 5462	-	386 4137	300 300	-	-
I	Humble Oil & Refining Co. #15-A P. H. Welder	5486	15200	14980	14850	P & A	06/15/37 12/14/93	Surface Liner	9.625 5.50	1023 5481	5 5	570 4471	240 260	Yes	9.5
												3658-3512 1550-1445 1073-1036 1036-758 300-6	50 35 40 38 114		
J	Humble Oil & Refining Co. #18-A P. H. Welder	5489	15580	15300	15125	P & A	09/12/37 03/29/89	Surface Production	9.625 5.50	1015 5489	-	4018	300 300	Yes	9.6
												5485-5285 2125-1950 1650-1500 1450-1375 1135-915 27-4	23 20 65 45 35 8		

TABLE 3-4

**TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 10,000-YEAR PLUMES
THAT PENETRATE THE INJECTION ZONE**

**Ineos USA LLC
Port Lavaca, Texas**

Map ID #	Well # and Lease	Total Depth (ft)	Distance to Injection Wells			Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data		
			WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)		Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)	
K	Exxon Corporation #19 P. A. Welder "A"	5490	16450	16130	15935	P & A	09/26/37 12/04/86	Surface Production	10.75 5.50	1022 5484	-	386 4014	300 300 1628-1475 1078-835 50-4	Yes	9.5
L	Exxon Corporation #17 P. A. Welder "A"	5487	16850	16600	16350	Producing Oil	08/04/37	Surface Production Tubing	9.625 5.50 2.00	988 5465 5265	-	4267	300 300	-	-
M	Exxon Corporation #16 P. H. Welder "A"	5496	16870	16595	16440	P & A	06/03/37 03/17/89	Surface Production	9.625 5.50	991 5482	1008	441 4267	300 260 4121-3920 2720-2600 1840-1720 1500-1291 1060-925 100-5	Yes	9.6
N	Humble Oil & Refining Co. #10 E. H. Welder	5456	15551	15621	15690	P & A	07/24/37 04/28/94	Surface Production Tubing	10.75 5.50 2.00	1026 5438 5420	432 1073 5107	3967	300 300 5454-4830 1550-1420 1088-962 46-5	Yes	9.7
O	Humble Oil & Refining Co. #6 E. H. Welder	5550	16552	16552	16621	Temporarily Abandoned	06/17/37 1996	Surface Production Tubing	10.75 7.00 2.375	1000 5453 5541	-	407 4115	300 300	-	-
P	Exxon Corporation #3 E. H. Welder	5479	16650	16610	16660	P & A	11/12/36 04/19/94	Surface Production Liner Tubing	10.75 7.00 5.00 2.875	916 5459 5442 5479	337 962 4136 5478	300 300 5479-5269 1550-1410 966-837 46-5	Yes	9.6	
Q	Humble Oil & Refining Co. #2 E. H. Welder	6050	16250	16300	16200	P & A	08/15/36 06/13/94	Surface Production Liner	10.75 7.00 5.00	1155 5438 5526	5	4100	510 300 5458-4830 4345-4175 1550-1408 1227-1097 90-5	Yes	9.5
R	Exxon Corporation #4 P. H. Welder "A"	5470	17080	16930	16860	P & A	10/05/36 11/18/72	Surface Production Tubing	10.75 7.00 2.50	872 5456 4792	4 4	279 4118	300 300 4307-4147 935-835 25-4	Yes	9.5
S	Exxon Corporation #6 P. H. Welder "A"	5550	17325	17145	17025	Temporarily Abandoned	12/18/36 1996	Surface Production Tubing Tubing	10.75 7.00 2.375 2.375	1050 5480 5531 5536	-	457 3452	300 300 300 50	-	-

TABLE 3-4

**TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 10,000-YEAR PLUMES
THAT PENETRATE THE INJECTION ZONE**

**Ineos USA LLC
Port Lavaca, Texas**

Map ID #	Well # and Lease	Distance to Injection Wells				Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data		
		Total Depth (ft)	WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)		Status	Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)
T	Humble Oil & Refining Co. #28 P. H. Welder "A"	8987	17793	17586	17448	P & A	01/13/53 08/26/81	Surface Surface Production	16.00 10.75 5.50	243 1976 5531	-	Surface Surface 4416	388 750 250 5484-5310 1942-1789 30 to Surface	Yes	9.5
U	Humble Oil & Refining Co. #A-7 Patrick H. Welder	5470	17586	17551	17586	Shut In	01/16/37	Surface Production Liner Tubing Tubing	10.75 7.00 5.00 2.50 2.00	1030 5456 5466 5381 5381-5409	-	437 4118	300 300	-	-
V	Humble Oil & Refining Co. #3 Patrick H. Welder	5490	17862	17758	17724	Shut In	09/08/36	Surface Production Liner Tubing Tubing	10.75 7.00 5.00 2.50 2.00	891 4854 5490 4740 5141	-	298 3516	300 300	-	-
W	Portilla Drilling Co. #1 Patrick H. Welder	5590	18034	17966	17172	P & A	10/18/36 03/25/02	Surface Production	10.75 7.00	554 5486	-	Surface Surface	5300-5136 1555-1445 850-750 600-500 350-250 15-5	Yes	10.1
X	Portilla Drilling Co. #2 Patrick H. Welder	5499	17690	17621	17551	P & A	10/27/36 03/20/02	Surface Production	10.75 7.00	900 5499	5	5	5300-5136 1700-1591 1555-1445 950-649 350-250 15-5	Yes	9.9
Y	Portilla Drilling Co. #3 Patrick H. Welder	5507	18100	17900	17750	P & A	12/04/36 12/05/36	Surface	10.75	966	-	-	300	Yes	NA
Z	Exxon Corporation #2 P. H. Welder "A"	5487	17100	16700	16400	Producing Gas	05/07/36	Surface Surface Production Liner	16.00 10.75 7.00 5.00	303 1460 5460 5400-5474	-	-	350 550 325	-	-
AA	Humble Oil & Refining Co. #24-A Patrick H. Welder	5486	16350	15900	15500	P & A	02/07/39 12/01/76	Surface Production	10.75 5.50	1013 5471	3	3	300 300 1650-1500 965-865 60-3	Yes	9.5
BB	Exxon Corporation #51 P. H. Welder "A"	5570	16350	15900	15500	Temporarily Abandoned	10/30/77 1996	Surface Production	8.625 5.50	1571 5558	-	Surface 3800	685 300	-	-
CC	Humble Oil & Refining Co. #48-A Patrick H. Welder 5460 PB	5595	16200	15700	15250	Producing Oil	06/09/72	Surface Production	8.625 2.875	1540 5594	-	-	290 550 5460-5480 CIBP@5480	-	-

TABLE 3-4

**TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 10,000-YEAR PLUMES
THAT PENETRATE THE INJECTION ZONE**

**Ineos USA LLC
Port Lavaca, Texas**

Map ID #	Well # and Lease	Total Depth (ft)	Distance to Injection Wells			Status	Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data		
			WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)			Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)	
DD	Humble Oil & Refining Co. #26-A Patrick H. Welder	5477	15800	15400	15100	P & A	02/27/39 12/17/81	Surface Production	10.75 5.50	1020 5464	-		300 300 5452-5309 2550-2160 1060-863 35 to Surface	Yes	9.5	
EE	Humble Oil & Refining Co. #35-A Patrick H. Welder	5570	15500	15100	14650	Producing Oil	09/29/66	Surface Production	7.00 2.875	507 5557	-		155 1160	-	-	
FF	Exxon Corporation #46-A Patrick H. Welder	5575	15350	14800	14400	P & A	11/21/68 06/24/92	Surface Production	8.625 2.875	1553 5573	1612	Surface 2333	CIBP@5415 5375-4800 1612-1343 90-5	390 495 16 85 26	Yes	9.5
LL	Humble Oil & Refining Co. #20 Eliza H. Welder	5601	14689	14931	15241	P & A	03/20/39 03/20/39	Surface Surface	16.00 9.625	41 1047	12 14	Surface Surface	600-500	300 50	Yes	NA
MM	Humble Oil & Refining Co. #37 Mrs. E. H. Welder	5550	15379	15655	15931	P & A	04/11/68 04/11/68	Surface	8.625	1549	-		1800-1472 to Surface	100 10	Yes	10.0
NN	Humble Oil & Refining Co. #19 Eliza H. Welder	5787	15586	15759	16000	P & A	12/16/38 12/16/38	Surface	10.75	984	-	391	1000	300 50	Yes	NA
PP	Humble Oil & Refining Co. #18 Eliza H. Welder	5454	16586	16724	17276	P & A	07/14/38 07/11/94	Surface Production	10.75 5.50	1013 5449	5 30	Surface 4484	5390-5370 4176-4103 3912-3736 3728-3548 1550-1427 1063-866 96-6	300 300	Yes	9.5
QQ	Humble Oil & Refining Co. #9 E. H. Welder	5450	16552	16690	16867	P & A	07/11/37 09/03/81	Surface Production	10.75 5.50	918 5431	-	325 4093	4404-4091 2418-2271 1050-750 150-Surface 90-Surface	300 300 100 30 50	Yes	9.5
RR	Humble Oil & Refining Co. #22 Patrick H. Welder "A"	5454	17172	17310	17517	P & A	06/13/38 07/07/94	Surface Production	10.75 5.50	1014 5449	1063	420 4484	5437-5427 5388-5207 1550-1405 1064-930 46-5	300 300	Yes	9.7
SS	Humble Oil & Refining Co. #A-15 Patrick H. Welder	5452	17483	17552	17724	Temporarily Abandoned	06/03/37	Surface Production Tubing	10.75 7.00 2.375	1020 5435 5343	-	427 4106	300 260	-	-	

TABLE 3-4

**TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 10,000-YEAR PLUMES
THAT PENETRATE THE INJECTION ZONE**

**Ineos USA LLC
Port Lavaca, Texas**

Map ID #	Well # and Lease	Distance to Injection Wells				Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data		
		Total Depth (ft)	WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)		Status	Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)
TT	Humble Oil & Refining Co. #A-12 Patrick H. Welder	9262	17069	17103	17241	P & A	05/21/37 04/18/83	Surface Production	10.75 7.00	1513 8608	1549	424	300	Yes	9.5
												7616-7446 3822-3722 1600-1500 14-4	35 30 50 5		
VV	Humble Oil & Refining Co. #A-9 Patrick H. Welder	5495	17483	17517	17621	Temporarily Abandoned	01/17/37	Surface Production Tubing	10.75 7.00 2.50	1111 5464 5349	-	518 4126	300 300	-	-
AAA	Humble Oil & Refining Co. #8 E. H. Welder	5456	16448	16551	16637	P & A	06/28/37 03/21/73	Surface Production	10.75 5.50	907 5438	4 4	Surface 3774	300 250	Yes	9.5
												5456-5350 922-822 57-4 74-4	20 45 6 16		
101	Petroleum MGMT #1 Robinson Ranch	8062	15600	14800	14050	P & A	08/27/81 08/28/81	Surface	9.625	1605	-	Surface	950 85	Yes	10.6
102	Paraffine Oil Corp. #1-B Welder	8823 6200 PB	16200	15600	15000	Shut In	10/24/78	Surface Production Tubing	8.625 4.50 2.375	1641 8766 5713	-	Surface 3112	675 980	-	-
103	Paraffine Oil Corp. #3-B Welder	8565	17300	16650	16000	P & A	03/01/79 9/20/04	Surface Production	8.625 4.50	1523 8541	4 1532	Surface 5000	625 940	Yes	9.5
												6312-6100 1575-1440 850-750 350-250 14-4	25 40 35 35 8		
104	Paraffine Oil Corp. #16-B Welder	6413	17200	16600	16100	Temporarily Abandoned	03/10/92	Surface Production Tubing	9.625 5.50 2.0625	1630 6413 6160	-	Surface 3200	400 610	-	-
105	Paraffine Oil Corp. #2-B P. H. Welder	7762 6134 PB	18000	17400	16850	Shut In	11/07/78	Surface Production Tubing	8.625 4.50 2.375	1498 6500 5454	-	Surface 4716	615 300	-	-
106	Paraffine Oil Corp. #2-B Welder (same well as #105)	7762 6358 PB										6154-6134	35		
107	Paraffine Oil Corp. #12-B Welder	6400	18150	17650	17150	Temporarily Abandoned	12/30/89	Surface Production Tubing	9.625 5.50 1.25	1639 6400 5319	-	Surface 2000	480 896	-	-
108	Humble Oil & Refining Co. #25-A P. H. Welder	5606	17000	16600	16150	P & A	02/16/39 02/16/39	Surface	10.75	997	-		300 190-90	Yes	NA
109	Humble Oil & Refining Co. #23-A P. H. Welder	5478	17750	17350	16900	Shut In	01/28/39	Surface Production Tubing	10.75 5.50 2.00	1006 5458 5429	-		300 300	-	-
110	Humble Oil & Refining Co. #31-A P. H. Welder	5600	18400	18000	17500	P & A	05/15/61 05/15/61	Surface	7.625	1098	-		1063 60	Yes	NA
111	Humble Oil & Refining Co. #33-A P. H. Welder	5565	18500	18100	17700	Shut In	05/18/66	Surface Production	7.00 2.875	741 5563	-		-	-	-

TABLE 3-4

**TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 10,000-YEAR PLUMES
THAT PENETRATE THE INJECTION ZONE**

**Ineos USA LLC
Port Lavaca, Texas**

Map ID #	Well # and Lease	Total Depth (ft)	Distance to Injection Wells			Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data			
			WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)		Type	Size (in)	Depth (ft)		Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)		
112	Union Petroleum Co. #52-A P. H. Welder	6642	16900	16600	16250	P & A	01/22/97 09/24/99	Surface Production	8.625 4.50	1614 6075	3 3	Surface 3800	720 625	Yes 4	9.5	
												5400-5380 1672-1552 1550-1350 13-3				
113	Humble Oil & Refining Co. #10-A P. H. Welder	5494	18300	18000	17700	Producing Oil	04/19/37	Surface Production Liner	10.75 7.00 5.00	1021 5484 5454-5494	-		300 300	-	-	
												2.875 5380				
114	Humble Oil & Refining Co. #5-A P. H. Welder	5496	18600	18300	18000	P & A	11/06/36 03/28/51	Surface Production Liner	10.75 7.00 5.00	552 5482 5455-5496	-		300 300	Yes	NA	
												CIBP@5452 CIBP@5430 5430-5205 30-0				
115	Humble Oil & Refining Co. #34-A P. H. Welder	5535	19500	19100	18750	Abandoned Location										
116	Portilla Drilling Co. #2-B Patrick H. Welder	6011	20000	19600	19200	P & A	08/30/37 08/30/37	Surface	10.75	1010	-	Surface	500 50	Yes	NA	
117	Portilla Drilling Co. #C-2 Patrick H. Welder	6500	19600	19100	18600	P & A	08/03/81 08/06/81	Surface	9.625	1557	-	3084	975 6340-6289 1535-13/2 25-12	Yes	9.9	
												1 50 50 10				
118	Paraffine Oil Corp. #1 P. H. Welder	9000	19400	18850	18300	P & A	10/18/80 02/08/94	Surface U Production L Production	9.625 2.875 2.875	1503 6513 6515	1563 1563	Surface 5000 5000	525 650 650	Yes	9.6	
												6210-6190 6140-6120 5360-5340 1553-1450 13-3				
119	Paraffine Oil Corp. #10 P. H. Welder	6505	19200	18700	18100	P & A	1/13/51 1/13/51	Surface	8.625	1210				Yes	NA	
120	Southland Drilling et al #1 P. H. Welder	6515	22100	21500	20050	P & A	07/13/72 07/14/72	Surface	10.75	440	-	Surface	345 1600-1420 400-300 20-Surface	Yes	9.7	
												70 40 10				
121	Southwest Oil #3 Welder Ranch	6290	20800	20150	19600	P & A	10/10/34 10/10/34	Surface	13.00	695	-	Surface	250	Yes	Heavy	
122	J. W. Mecom #1 Patrick H. Welder	9856	20000	19350	18700	P & A	4/16/49 2/10/54	Surface Production	10.75 7.00	1025 9514	1012		913-1010	50	Yes	NA
123	Southwest Oil #B-8 Welder	9444	19500	18800	18100	P & A	09/19/80 09/22/80	Surface	9.625	1579	-	9	600 1650-1550 10-Surface	Yes	9.7	
												50 10				

TABLE 3-4

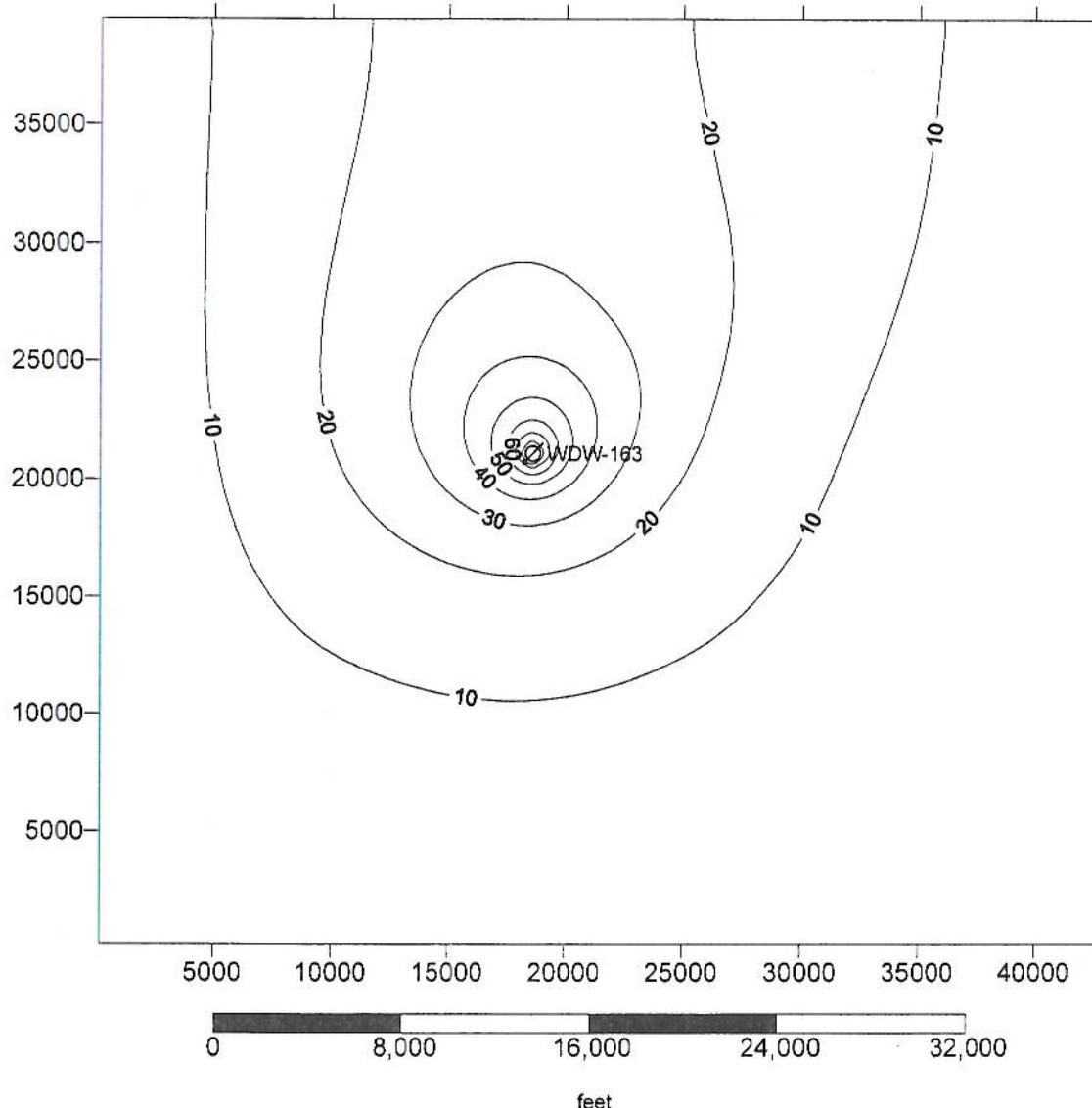
**TABULATION OF ARTIFICIAL PENETRATIONS WITHIN THE 10,000-YEAR PLUMES
THAT PENETRATE THE INJECTION ZONE**

**Ineos USA LLC
Port Lavaca, Texas**

Map ID #	Well # and Lease	Distance to Injection Wells					Drill Date P & A Date	Casing Data			Top of Cement	Cement Data		Mud Data	
		Total Depth (ft)	WDW-163 (ft)	WDW-164 (ft)	WDW-165 (ft)	Status		Type	Size (in)	Depth (ft)	Removed (ft)	Plugged Depth (ft)	Volume (sx)	Mud Filled (Y/N)	Mud Weight (lb/gal)
124	Southwest Oil #B-7 Welder	8413	20400	19700	19000	Shut In	06/20/80	Surface U Production L Production Tubing	9.625 2.875 2.875 1.25	1510 8374 8407 7475	-	Surface 5200 5200	525 1145 1145	- -	- -
125	American Cometrta, Inc. #14-B P. H. Welder	8400 7775 PB	20600	19900	19250	Shut In	09/04/91	Surface Production Tubing	10.75 7.00 2.375	1571 8400 7736	-	Surface 5025	745 1090 25	- -	- -
126	Paraffine Oil Corp. #10-B P. H. Welder	8207 6820 PB	20800	20100	20400	Temporarily Abandoned	05/05/81	Surface Production Tubing	9.625 5.50 2.375	1627 8207 6498	-	Surface 4650	1061 860	- -	- -
132	Paraffine Oil Corp. #5-D P. H. Welder	7750	22150	21500	20800	P & A	08/13/81 04/18/89	Surface Production	9.625 4.50	1554 6475	4 1750	Surface	1025 550	Yes	9.5
												5515-5410 1650-1500 10-0	18 50 5		
133	Paraffine Oil Corp. #4-D P. H. Welder	8786	23300	22700	22000	P & A	10/30/80 01/07/94	Surface Production	9.625 4.50	1633 7059	3 1623	Surface 3562	575 850	Yes	9.6
												6600-6440 1685-1500 13-3			
141	Tennessee Gas Trans. #26-C P. H. Welder	5539	18200	18400	18700	P & A	07/28/57 07/28/57	Surface	10.75	1037	-	Surface	470	Yes	NA
												4000-3900 1600-1500 1060-1000			
142	Unit Petroleum Co. #54-A Welder	6467	16800	16400	16000	Producing Oil	11/30/97	Surface Production Tubing	8.625 4.50 2.375	1610 6480 5656	-	Surface 4717 5656	810 365	- -	- -
143	Unit Petroleum Co. #55-A Welder	6430	18000	17500	17100	P & A	12/02/98 12/05/98	Surface	8.625	1516	-	Surface	485	Yes	9.9
												1460-1430 850-750 350-250 13-3	37 36 36 10		
144	Unit Petroleum Co. #2-D Welder	6500	14950	15000	15100	P & A	9/25/97 9/27/97	Surface	8.625	1640	-	Surface	450 85	Yes	9.5
												1690-1450 13-3	10		

Note: NA = not available, PB = plugged back

163pr34 pressure increase at end of projected 10 years operations at 500 gpm.
500 mD. Heavy injectate 1.07 sp. gr.



W - 6 2009

FIGURE 3-1

PRESSURE INCREASE AFTER
10 YEARS FUTURE INJECTION
WDW-163 INTERVAL INTERVAL

PREPARED FOR

INEOS USA LLC
PORT LAVACA, TEXAS